

# **Advanced Prototype Fan Operating Experience, Post Test Evaluation, And Refurbishment For PLSS 2.0 Test Use**

Abstract submitted for the 43<sup>rd</sup> International Conference on Environmental Systems

Session: ICES402: EVA Portable Life Support Systems

Edward Hodgson, William Oehler, Steve Dionne, David Converse  
*United Technologies Corporation Aerospace Systems, Windsor Locks, Connecticut*

Mallory A. Jennings  
*NASA Lyndon B. Johnson Space Center, Houston, Texas, 77058*

NASA's plans for Extravehicular Activity (EVA) portable life support systems for future exploration missions result in different design requirements than those which led to the combined fan / pump / separator in the current ISS Extravehicular Mobility Unit (EMU). To meet these new requirements, NASA contracted with Hamilton Sundstrand to provide two new prototype fans designed to meet anticipated future system requirements. Based on design trade studies, a high speed fan with mechanical bearing support of the rotating elements and a novel non-metallic barrier canned motor design was developed and implemented in the deliverable prototypes. The prototypes, which used two different bearing lubricants, have been extensively tested in both stand-alone and integrated system tests in NASA laboratories and proven to meet the anticipated performance requirements. Subsequently, they have been subjected to post test inspection and analysis in Hamilton Sundstrand laboratories to assess the effects of integrated operation and resultant exposure to vent loop contaminants. Results have confirmed expectations that one of the lubricants would be superior in this application and the prototype fans have been reassembled with new bearings with the superior lubricant. They have now been returned to the Johnson Space Center for further testing and maturation as part of NASA's PLSS 2.0 integrated test effort. This paper will discuss the test history of these units, resulting test data, the results of post test evaluation, and plans for further testing in the near future.